REMARKS

A spelling error in the patent application specification has been corrected by this amendment.

Claims 16-20 have been canceled without prejudice or disclaimer as being drawn to a non-elected invention. Claims 4 and 10 remain in the application, and the undersigned requests rejoinder as these claims depend from allowable independent claims as discussed in detail below. The application now includes claims 1-15.

Claim 12 was object to for an antecedent basis error. Claim 12 has been corrected by an amendment changing "the optical fiber" on page 27, line 6 to ""the first optical fiber", as suggested in the Office Action.

Claims 1, 5-7, 11-12, and 15 were rejected under 35 USC 102(b) as being anticipated by US Patent 6,084,994 to Li et al. Claims 2-3, 8-9, and 13-14 were rejected as being unpatentable over Li et al. in view of US Patent 5,943,149 to Cearns et al. These rejections are traversed.

The present invention provides wavelength selective optical devices (e.g. filters, add/drop multiplexers or other wavelength division multiplexing (WDM) devices) having wavelength selectivity with exceptionally high wavelength accuracy. The present wavelength selective devices include a graded index (GRIN) lens having a refractive index distribution constant ($A^{1/2}$) that is adjusted such that a filter receives light at an angle necessary to transmit or reflect at desired wavelengths. The present inventors have discovered that the refractive index distribution constant $A^{1/2}$ influences the angle of light emitted from the GRIN lens, and that this effect can be used to tune the operation of the optical filter. In other words, the wavelength selectivity of the present devices is easily tuned by adjusting the refractive index distribution constant $A^{1/2}$. In this way, the present invention provides low cost wavelength selective devices with exceptionally high wavelength accuracy.

It is essential in the invention to tune the wavelength selective device by adjusting the refractive index distribution constant $A^{1/2}$. The distribution constant $A^{1/2}$, as explained on pages 13 and 14 of the present specification, is a number that is representative of the refractive index profile of the lens. The refractive index distribution constant can be

varied by adjustments to the glass material of the GRIN lens, ion exchange conditions during manufacture of the lens, or annealing processes after lens fabrication (see page 14, lines 10-18), for example. The refractive index distribution constant is a function of the spatial variation in chemical composition of the GRIN lens.

By comparison, Li et al does not teach or suggest that the refractive index distribution (or any other design feature of the GRIN lens) can be adjusted to provide wavelength tuning. Li et al. does not teach or suggest a wavelength selective device having a GRIN lens with a refractive index distribution constant adjusted to provide wavelength selectivity in a desired range, as required by claims 1, 6, and 12

Li et al. provide wavelength tuning by a very different means. Specifically, in Li et al., wavelength tuning is provided by adjustment of the distance "d" illustrated in Figs. 2 and 6, or d1, d2, d3, d4 illustrated in Fig. 3. The distances d, d1, d2, d3, d4 are the distances from the fibers 102, 112, 114, 116, 118, 302 to the axis 111, 211, 311 of the GRIN lens. Specifically, in col. 2, lines 51-55, Li et al state: "The method and system further comprise selecting the distance [distance d] to tune the angle of incidence so that the filter transmits a substantial portion of the first optical signal centered around at least one particular wavelength." Similarly, col. 6, lines 18-22 state: "The angle of incidence can be changed by changing the distance between the axis 111 and the fiber 102. By changing this distance, the central wavelength of the pass band of the filter 130 can be tuned so that light of desired wavelengths is transmitted by the filter 130." It is clear that Li et al. adjusts the distance between the optical fiber and axis to provide wavelength tuning. Li et al. does not teach adjustment of the refractive index distribution of the GRIN lens, as required in the present invention.

The Office Action refers to col. 4, lines 57-59 of Li as teaching adjustment of the refractive index distribution constant. This is wrong. Col. 4, lines 57-59 and Fig. 1C of Li et al. describe a method prior to Li et al. in which an angle of the filter 58 is <u>mechanically</u> adjusted to tune the wavelength selectivity. This method does not in any way rely upon adjustment of the refractive index distribution of the GRIN lens or any other adjustment of the GRIN lens structure or design. The wavelength adjustment method described in col. 4, lines 57-59 and Fig. 1C of Li et al. is completely different from the present invention.

Additionally, the Office Action includes the erroneous statement that "the shift of refractive index distribution constant to the desired range is the purpose of employing an optical fiber such as one taught by Li et al." This statement is erroneous because the filter of Lie et al. does not and cannot in any way provide a "shift of refractive index distribution constant". The refractive index distribution constant is a property of the GRIN lens and cannot be changed except by annealing or other physical processes that influence the distribution or properties or materials within the GRIN lens. The filter cannot change the refractive index distribution of the GRIN lens.

In view of the arguments above, the rejections of claims 1, 6, and 12 are traversed and the rejections of these claims must be withdrawn.

Regarding claims 5, 11, and 15, the Office Action argues that selecting one of a plurality of GRIN lenses according to refractive index distribution constant to adjust wavelength selectivity range would be within ordinary skill in the art. This is wrong. There is no hint of selecting refractive index distribution of the GRIN lens to provide wavelength tuning in any of the references cited. None of the references even mention that the refractive index distribution constant can influence the angle of incidence of light emitted by the GRIN lens. One of ordinary skill in the art would not make the essential and unexpected connection that adjustment in the refractive index distribution constant will adjust the angle of incidence and thereby allow tuning of the wavelength selective device. It is not known or obvious that adjustment of the refractive index distribution constant will affect the wavelength selectivity of a filter receiving light from the GRIN lens. The rejection of claims 5, 11, and 15 is therefore erroneous and the rejections of these claims must be withdrawn for this additional reason.

Cearns et al. also fails to teach or suggest a wavelength selective device having a GRIN lens with a refractive index distribution adjusted to provide a wavelength selectivity in a desired range. Cearns et al. does not teach or suggest that the refractive index distribution can be adjusted to tune an optical filter. Since the claims require wavelength tuning by adjusting the refractive index distribution of the GRIN lens, no conceivable combination of Li et al. and Cearns et al. can produce or render obvious the present invention as claimed.

Claims 4 and 10 were withdrawn as being drawn to non-elected species; they should now be considered and be allowed, as they depend from allowable claims 1 and 6.

In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 1-15 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees for the petition or for entry of this amendment to Attorney's Deposit Account No. 50-2041 (Whitham, Curtis & Christofferson P.C.).

Respectfully submitted,

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